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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of

Amendment of the Commission's Rules to Establish a Single AM Radio Stereophonic Transmitting Equipment Standard	} } }	ET Docket No. 92-298

RESPONSE OF MOTOROLA INC.

Motorola respectfully submits the attached information in the proceeding captioned above.

Respectfully submitted by:

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October 14, 1993

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RESPONSE

Background and Preliminary Statement:

On August 31, 1993 and September 7, 1993, late pleadings were submitted by Mr. Leonard Kahn and Mr. David Solinske, respectively, with regard to tape recorded comparisons of the ISB and C-QUAM systems as received on a Motorola-type decoder.

Motorola reluctantly responds to late filings made by Leonard Kahn and David Solinske (August 31, 1993: Kahn, September 7, 1993: Solinske) with regard to tape recorded comparisons of the ISB and C-QUAM systems as received on a Motorola type decoder.

In the response of Leonard Kahn dated August 31, 1993 and amended September 3, 1993, Mr. Kahn indicates that it was not his intention that the Win-Win solution include transmission of the 25 Hz C-QUAM pilot with his system. Motorola would like to call to the Commission's attention the log of Kahn Tape #2, dated 6/18/93. The third selection did indeed purportedly compare reception of the ISB signal on a (Delco) C-QUAM receiver. The quality of this signal was directly compared to the quality of a C-QUAM transmission as received on the same (Delco) C-QUAM radio. Furthermore, Kahn stated in the Win-Win proposal that "The secret is that under good listening conditions not only do all of the AM Stereo systems sound superb, but they sound superb with the WRONG RECEIVERS!" Hence, it is Motorola's observation that one of the obvious intents of the Kahn Win-Win proposal was the reception of ISB on C-QUAM Stereo receivers in the stereo mode. There was no error of misinterpretation.

Motorola would also like to assure the Commission of the integrity of the Motorola submitted tape. Two Kahn STR-84 exciters were used for the comparison. Motorola made no changes or adjustments to the internal transmitter section. Operation of the exciters was checked in accordance with the instructions found on pages 42 through 44 of the Kahn STR-84 manual[1]. Spectrum measurements, assuring proper alignment, are filed with this reply. In addition, subjective performance was also

[1] It was not Motorola's intention to re-adjust the ISB system, but rather to use it in its original factory adjusted condition.

verified using an ISB (Sony SRF A-100) receiver. The results were acceptable. As indicated in the Motorola test tape, modulation was limited to -85 to -90% since the test point used on the STR-84 exciter (mod. point 2) limited the envelope to approximately -93% modulation. Both Kahn exciters had similar negative limits placed on modulation level. To the best of our knowledge and abilities, the exciter was properly set up and operated. We did take full advantage of the processing capability provided by the external matrix ports on the STR-84 exciter which insured high density audio processing without overshoot. The C-QUAM exciter used for comparison was also adjusted for the same density of modulation[2].

Several points have been raised by Mr. Solinske:

1) The ISB and C-QUAM systems transmit substantially differing levels of phase modulation. Furthermore, the non-linear "compression" of phase modulation encoded by C-QUAM (an arc tangent function) vs. that of the Kahn system (a modified phase modulation system similar to the arc sin function) would cause Intermodulation Distortion products when improper decoders are utilized. The incompatibilities between the systems are most apparent when high envelope and phase modulation are simultaneously present which is the case with matrix processing systems.

2) Proper ISB performance was verified on the STR-84 prior to the recorded tests. The equipment and conditions utilized are listed in the recording including the use of NRSC band limiting and pre-emphasis. A spectral photo is included in this report to show performance verification of the Kahn system[3].

3) The WSYR tests did indicate high levels of ISB distortion on C-QUAM type receivers as reported by broadcasters using the C-QUAM system. The distortion was immediately audible causing concern that the public might confuse the poor quality with AM Stereo rather than improper decoding of the ISB signal on a C-QUAM decoder.

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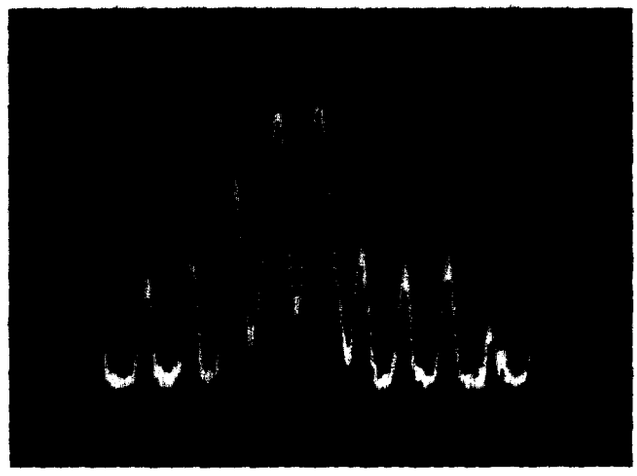
[2] Results obtained and submitted to the Commission are in line with those experienced in the United States as well as during monitoring of the tests in Japan. Furthermore, when ISB stations in Syracuse, NY and other locations experimented with transmission of the 25Hz. pilot during the mid to late 1980's, Motorola received complaints concerning the high levels of distortion caused by reception of the ISB signal on C-QUAM receivers.

[3] Note that 35 dB suppression of the undesired sideband was indicated at mod point 2 when excited to an envelope modulation level of 60%.

4) Mr. Solinske recommends using a Sony SRF-A1 radio to check the performance of the Kahn system in the "A" position (Harris, Magnavox, Motorola Compatible position). Mr. Solinske has missed the point. The Sony SRF-A1 utilized a Kahn-type decoder in all operating modes. Only the audio phase shift networks required to properly image the ISB signal are removed in the "A" position. The Sony SRF-A1 is not a C-QUAM decoder and therefore can not be used to judge the performance of the Kahn ISB system on a C-QUAM radio! This could only lead to contaminated conclusions.

The Motorola submitted tape is representative of the poor results obtained when demodulating a fully modulated Kahn ISB signal on a C-QUAM receiver. Every precaution was taken to assure a valid comparison under representative modulation conditions.

At this point the record in this Rulemaking is complete. The Commission can appropriately move forward to select, as proposed, the C-QUAM standard for AM Stereo transmitting equipment.



SPECTRAL PHOTOGRAPH

KAHN STR-84 EXCITER

60% LEFT CHANNEL MODULATION

(ENVELOPE REFERENCE)

1 kHz SINE WAVE MODULATION

10 dB/div VERT, 1 kHz/div HORIZ

MOD. PT. 2 (1.4 MHz)

35 dB UNDESIRED SIDEBAND SUPRESSION

CERTIFICATE OF SERVICE

I, Alice M. de Séve, of Motorola Inc., do hereby certify that on this 14th day of October, 1993 a copy of the foregoing "Comments" was sent to each of the following by first-class mail, postage-prepaid except where service by hand is indicated(*):

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